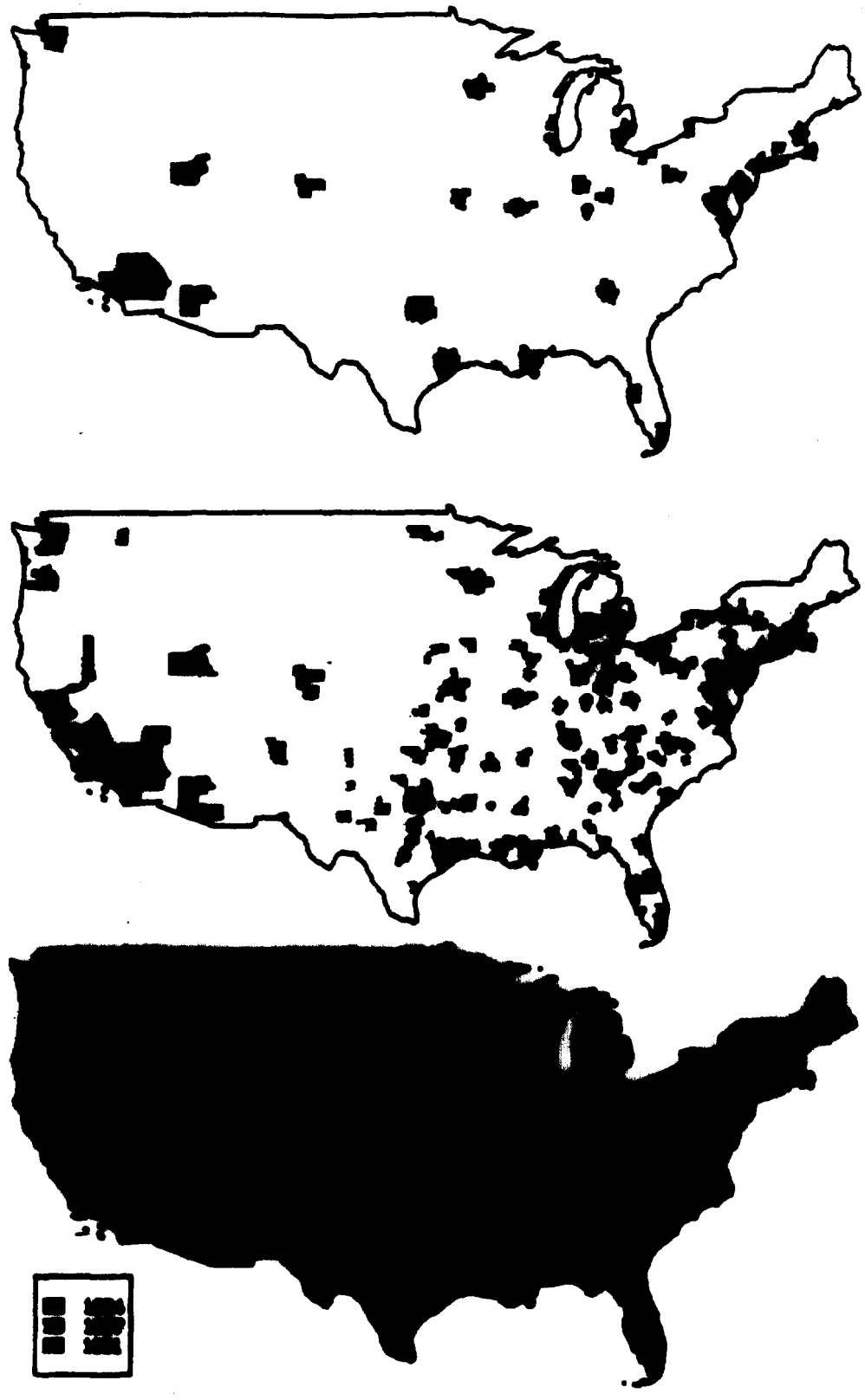

Map 2.1(a)-(c). MSAs and RSAs With at Least One License as of (a) 1984; (b) 1987; (c) 1991.

Table 2.1. Issuance of RSA Licenses and Construction Permits (Number Granted).					
	1989	1990	1991	Not Granted	Total Systems
Non-Wireline (A Block)	3	194	160	71	428
Wireline (B Block)					
B1	5	254	167	2	428
B2	0	51	21	0	72
B3	0	16	4	0	20
B4	0	2	3	0	5
B5	0	0	2	0	2
B6	0	1	0	0	1
Source: FCC, STATUS OF RSA CELLULAR MARKETS (Oct. 2, 1991).					
Note: The multiple B Blocks reflect the geographic partitioning of RSAs among several providers in the settlement process.					

Consumer Perspectives

All forms of telecommunication reach across space, but this is especially true of mobile services. With mobile telecommunications, it is not only information that moves but the transmission path itself. This defining characteristic of mobile services makes it almost impossible to define meaningful geographic markets once regulatory considerations have been removed from the picture. It is, indeed, oxymoronic to define stationary, fixed geographic markets for a service aimed specifically at consumers who are moving.

One undoubtedly can define certain geographic *ranges* over which some types of service will typically be used. Ordinary cordless phones, for example, are expected to operate only within shouting distance of the base unit. The emergency room of a Manhattan hospital that needs to keep in touch with its doctors will need pagers that reach as far as Queens, but probably not as far as San Francisco. Some fraction of customers will surely use their pagers or mobile telephones only for short-range communication.

The required range of operation does not, however, define any useful geographic market. Cordless phones are expected to provide only short-range mobile connections, but they are expected to provide such connections in any home, wherever located. Even if short-range paging services constitute a discrete market, the people who use them may be located anywhere. A general practitioner in a one-doctor town may need a short-range pager even more than a doctor associated with an emergency room in an urban hospital. Any stationary line drawn on a map to distinguish one geographic market from another is almost certain to be a line regularly crossed by some number of would-be consumers. Obviously, some stationary lines on a map are crossed less often than

others. But almost any such line will effectively define some prospective consumers of mobile services out of the market entirely.

It is equally true that one substantial part of the growth of mobile telecommunications services has been impelled by the daily commuting habits of millions of Americans. Most commuting is suburb to suburb; the average commute is estimated to be about 10 to 15 miles.[34] Many doctors, executives, and sales persons undoubtedly use mobile services largely within such well-defined geographic areas. But the travel patterns of the daily commuter do not begin to define geographic bounds for today's market. Even among daily commuters, many travel much larger distances. And many travel routes are quite different from those defined by the clogged highways that converge in major cities. The rancher, trucker, or operator of a water taxi are all potential consumers of mobile services.

The list of "communities of interest" for mobile services can be extended almost indefinitely. Car rental companies have begun to equip their fleets with credit-card telephones;[35] the geographic community of interest here is presumably defined by the travel patterns of typical customers, including of course vacationers and one-way renters. There is a growing market for cellular telephone service to boats, both commercial and pleasure; the geographic scope of these markets is defined by interconnected navigable waters. (In 1988, the FCC responded to provider requests by permitting extensions of cellular service areas over water, to serve boats.)[36] The service area of interest for many truckers and interstate bus companies is defined by the interstate highway system. GTE Railfone provides public-telephone access on major Amtrak routes on the east and west coasts, through standard cellular networks.[37] Air travellers currently use GTE's Airfone to place calls anywhere over the United States and Southern Canada, including Alaska, Hawaii, Puerto Rico, and the Virgin Islands, or within 200 miles of the U.S. coastline.[38]

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[34] Yates, *Dear Commuter: Pay Up!*, WASHINGTON POST MAG., Apr. 23, 1989, at W30; Hmielesld, *Researcher Calls Old Surveys a "Setup"*, UNITED PRESS INT'L, July 20, 1990.

[35] In January 1989, Hertz, the nation's largest car rental company, signed a multi-year agreement with GTE to equip some 50,000 Hertz rental cars with cellular credit-card telephones. *GTE Mobile Communications, Hertz Announce Multiyear Agreement for Cellular Credit-Card Phones*, PR NEWSWIRE, Jan. 17, 1990.

[36] Amendment of the Commission's Rules for Rural Cellular Serv., 3 FCC Rcd 4403 (July 6, 1988).

[37] *GTE Airfone to Install its Railfone System on More Than 150 Eastern Airlines Aircraft*, PR NEWSWIRE, Sept. 25, 1990. In 1985, the FCC declined to allocate a single nationwide frequency specifically for phones on trains. Amendment of the Commission's Rules to Allocate Spectrum for, and to Establish other Rules & Policies Pertaining to the Use of Radio in Establishing a Public Air-Ground Telephone Sys., 57 Rad. Reg 2d (P & F) 1219, 1223 (Jan. 14, 1985).

[38] *GTE Airfone and COMSAT to Offer Global Satellite-Communications Service for Airline Passengers*, PR NEWSWIRE, Sept. 12, 1990. By late 1991, airline passengers will be able to use Airfone while flying anywhere in the world. GTE, 1990 ANNUAL REPORT 22 (1991).

This list of the communities of customers who are likely prospects for integrated mobile service cannot possibly be exhaustive. Say's Law operates in the market for mobile telephony: supply creates its own demand. This is usually the case with highly innovative new services; until the service exists there is really no way to determine who will want it. The technology and the service come first; communities of interest are redefined as a result.[39] It would have been difficult to anticipate, for example, that one community of interest for cellular telephone service would be defined by a 1,800-mile gas pipeline, along which a natural gas company would install solar-powered cellular phones to transmit gas flow measurement data. GTE, however, recently supplied just such a service to just such a customer.[40]

One of the most apparent and far-reaching developments in redefining communities of interest for mobile services has been the transformation of the mobile receiver. Only a few years ago, mobile telephones were bulky and heavy, as were pagers. The size of the receivers limited their mobility. But both pagers and cellular telephones have been shrinking very rapidly. Within the last year or so, Motorola introduced a $300 Wrist Watch Pager that weighs about 2 ounces and stores up to eight time-stamped messages.[41] AT&E's Receptor Messagewatch, which retails for $225, likewise incorporates a miniaturized radio receiver in the wristwatch.[42] Motorola also introduced the "personal" phone in 1989: the 6-inch, 12.3-ounce "MicroTAC" that folds to the size of a checkbook.[43] A year later Mitsubishi responded with the DiamondTel, a 10.5-ounce phone the size of a dollar bill.[44] Two months later Fujitsu unveiled the Pocket Commander, slightly larger than a pack of cigarettes,[45] with the declared aim of "liberat[ing] the cellular phone from the car and the briefcase."[46] Nippon Telegraph and Telephone

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[39]The advent of 800 numbers transformed retail markets generally; people now routinely shop for clothes, computers, and Cuisinarts® at distances of thousands of miles. These new communities of consumer interest coalesced around the service itself. Much the same has been observed following the introduction of such things as overnight mail delivery or new commuter rail services.

[40]GTE, 1989 ANNUAL REPORT 15 (1990).

[41]Richards, *Pager Companies Count on Masses to Answer Call of Cheaper Fees*, USA TODAY, Sept. 5, 1990, at 6B.

[42]*AT&E Finishes Portland Market Trial, Achieves Consumer Acceptance*, INDUSTRIAL COMMUNICATIONS Nov. 9, 1990, at 10; *AT&E Unveils World's First Wristwatch Pager*, BUSINESS WIRE, June 12, 1990.

[43]*What's Hot, What's Not*, USA TODAY, Dec. 24, 1990, at 3B; Silverthorne, *Cellular Phones Spread To More Users As Prices Fall*, INVESTOR'S DAILY, Feb. 1, 1991, at 6.

[44]*What's Hot, What's Not*, USA TODAY, Dec. 24, 1990, at 3B.

[45]*Ibid.*; Edelman, *News in Technology*, BOSTON GLOBE, Dec. 23, 1990, at A48.

[46]*Liberating Cellular Phones*, WASHINGTON TIMES, Nov. 12, 1990, at D6.

Corp. plans to market an 8-ounce phone in 1991.[47] Universal Cellular's recently announced PagerPhone, a combined cellular telephone and pager, weighs 13 ounces and is about 5 inches long.[48]

The new portables have proved hugely successful in the market. Prices have dropped dramatically; pocket phones are now available for as low as $500.[49] In 1987, portables accounted for about 5 percent of sales of cellular telephones; today they account for an estimated 15 percent of total sales.[50] By late 1989, portables already accounted for one in three cellular handsets sold in the U.K.[51] The Eastern Research Corporation projects that portable and transportable phones will account for almost half of all sales by 1994.[52] Craig McCaw predicts that cellular telephony will "inevitably" "become[] more portable and less car phone." Market boundaries will thus come to depend not on "where automobiles go, but where people go."[53] Contel's 1989 annual report makes a similar observation. "No longer considered just a car phone, growth in cellular usage is coming from more portable equipment and new customer bases that include service personnel, sales representatives, mid-level managers and security-minded families."[54]

That trend is already evident in market data. Nationwide paging services, for example, have been growing much faster than other sectors of the industry. There has likewise been a steady increase in demand for "roaming" cellular services. Several recent estimates place roaming revenues at about 8 to 11 percent of the cellular market;[55] those revenues have been rising steadily.[56] One report found that roaming revenues

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[47]*Matsushita Announces Optical Integrated Circuit; NTT Claims Smallest Cellular Phone*, REPORT FROM JAPAN, Dec. 10, 1989.

[48]*Pocket-sized Phone With Pager Debuts*, UNITED PRESS INT'L, Dec. 12, 1990.

[49]Kupfer, *The Go-Anywhere Phone is at Hand*, FORTUNE, Nov. 5, 1990, at 143.

[50]U.S. DEP'T OF COMMERCE, 1991 U.S. INDUSTRIAL OUTLOOK 31-8 (1991).

[51]Purton, *Mobile Communications 4; Portable Push*, FIN. TIMES, Sept. 19, 1989, at 42.

[52]EASTERN RESEARCH CORP., CELLULAR TELEPHONES: THE NEXT FIVE YEARS 6 (1989) (graph showing share of cellular phone sales by type of phone – mobile, transportable, and portable).

[53]MCCAW CELLULAR COMMUNICATIONS, INC., CELLULAR COMMUNICATIONS: A VISION OF THE FUTURE 10 (Oct. 20, 1989).

[54]CONTEL, 1989 ANNUAL REPORT 13 (1990).

[55]*See, e.g.*, CTIA, DATA SURVEY THROUGH DECEMBER 1990, at 1 (1991).

[56]*Id.* at 8; CTIA Press Release, Cellular Subscriber Count Climbs Past 4 Million 2 (Sept. 4, 1990)

increased by 11.1 percent in the first six months of 1990 alone.[57] The coming of age of the portable telephone, combined with the increasing mobility and wanderlust of Americans generally, makes nonsense of any attempt to define geographic markets for mobile services by reference to cars. Five years ago the movement of cars largely defined the movement of mobile phones; today it manifestly does not. A recent estimate concluded that 60 percent of cellular traffic is vehicular;[58] this means that 40 percent is not. By several accounts, small, portable phones are the fastest growing segment of the cellular telephone market.[59]

Market surveys confirm that today's consumer expects mobile service to be just that -- completely mobile, not tied to the landline network by either a wire or a line on the map. According to one consulting firm's 1991 report on the cellular industry, "[c]ellular subscribers select service providers primarily on the basis of clear reception and geographic coverage."[60] "[T]he value of the service is certainly limited if it is not available on demand * * *. [P]rospective end users generally believe that cellular service should be directly equivalent to the service provided (and taken for granted) by the local telephone exchange carrier. * * * [Faced with] static, weak signals, or poor cell handoff experiences, end users do not hesitate to change carriers or to disconnect in toto."[61] The report goes on to note that "[o]ver 10% of cellular subscribers have switched cellular providers. Leading the list of reasons for changing carriers is inadequate coverage area * * *."[62] "The message is clear to service providers. To effectively control and grow the installed base, the cellular provider must continue to * * * improv[e] the coverage area * * *."[63]

Another indication of what today's consumers want is the fact that, in their sales pitches, every cellular provider positioned to do so emphasizes the geographic breadth of its coverage above all other factors. McCaw, the largest cellular company, of course has had the most to emphasize. The sales brochures for its flagship service area boast

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[57]CTIA Press Release, Cellular Subscriber Count Climbs Past 4 Million 2 (Sept. 4, 1990).

[58]U.S. DEP'T OF COMMERCE, 1991 U.S. INDUSTRIAL OUTLOOK 29-7 (1991).

[59]*See, e.g.*, Stevens, *The Phone Options for People on the Go*, L.A. TIMES, May 1, 1991, § E, at 5, col. 1; *Business Technology: A Pocket Cellular Telephone*, N.Y. TIMES, Feb. 27, 1991, § D, at 7, col. 5.

[60]LINDEN CORP., CELLULAR NETWORK TECHNOLOGY, END USER REQUIREMENTS AND COMPETITION TO THE YEAR 2001, at 205, 209, 211 (1991).

[61]*Id.* at 205.

[62]*Ibid.*

[63]*Id.* at 207. Cellular operators have come to similar conclusions. Century Telephone Enterprises notes that its "research indicates that customers consider coverage area one of the most important features of a cellular system." CENTURY TEL. ENTERPRISES, INC., 1990 ANNUAL REPORT 5 (1991).

of "the largest [coverage] of any service provider in the Pacific Northwest."[64] They tout "Exclusive Wide Receiver service throughout the states of Washington, Oregon and Idaho" and explain that "with Wide-Receiver service, callers from your home area can reach you simply by dialing your seven-digit number. This eliminates the need for confusing roaming numbers and area codes and demonstrates the ability of advanced technology to assign numbers to people, not to places."[65] McCaw also emphasizes its coverage of important highways in the region.[66] McCaw's sales brochures in all the other cluster areas it serves contain similar claims. TABLE 2.2. More generally, McCaw repeatedly informs potential subscribers that it offers "the most square-mile coverage in the industry,"[67] that it operates "the largest personal communications network in the world,"[68] and that it is "the only company building a nationwide communications network."[69] In mid-October 1991, McCaw announced that it would begin to provide nationwide automatic call delivery throughout its system and will eventually expand its coverage nationwide through agreements with other non-wireline providers.[70]

It is thus increasingly apparent that the individual consumer of mobile services probably does not much care where other people drive, boat, train, or fly. What the individual consumer demands is service to the telephone in his coat pocket, boat, plane, train, or car. What the corporate consumer wants is service of a geographic scope coextensive with corporate operations. If some consumers routinely commute from suburbs into the metropolis, others routinely begin in the suburbs and head outward, others roam in rural areas, others cruise the interstate highways, still others take occasional, long trips by train or plane, and others range across territories defined by far-flung corporate activities. All are potential consumers of mobile services, but each requires the service in a different geographic area.

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[64]McCaw Sales Brochure & Coverage Map for Tacoma, WA (Feb. 1991).

[65]*Ibid.*

[66]See, e.g., *Ibid.* (McCaw provides contiguous service for approximately 480 miles along I-5, from south of Eugene, OR into Vancouver, B.C.); McCaw Sales Brochure & Coverage Map for Portland, OR (current as of Jan. 1991) (same).

[67]McCaw Sales Brochure & Coverage Map for Visalia, CA (1991).

[68]McCaw Sales Brochure & Coverage Map for Wichita, KS at 1 (1990) (brochure entitled *Welcome to Cellular One*).

[69]*Ibid.*

[70]Keller, *McCaw Cellular Plans to Create National Service*, WALL STREET JOURNAL, Oct. 15, 1991, at B4. In a recent sales brochure, McCaw explained that "this first phase of the National Network begins to make a cellular network that has no boundaries a reality. It underscores our commitment to improving how people communicate." McCaw Sales Brochure & Coverage Map for Western Pennsylvania and West Virginia (1991).

Table 2.2. McCaw's Marketing Claims.

* Florida: "Clearly covering more of Florida." "Largest automatic cellular network in Florida," one that offers "[r]eachability in over 1,000 cities across the U.S., Canada and the Caribbean." "Maximum [r]eachability." "Maximum [c]overage." "Able to reach and be reached from any of our Florida cities." "[M]ore contiguous local calling areas in Florida." "Five County Continuous/Local Calling Area." "By eliminating registration procedures and complicated access codes, we've made dialing within the Cellular One network nearly as simple as dialing from your home or office phone."

* Texas: "Cellular One links Temple, Killeen, Austin, San Antonio, Corpus Christi, Bryan and College Station to form one, unified cellular network. Only Cellular One provides continuous, uninterrupted cellular calling capability for 150+ miles along I-35. Calls to your local cellular phone automatically find you anywhere within our Texas network."

* California: "As the nation's largest cellular phone company, Cellular One offers you clear advantages." "We provide the most square-mile coverage in the industry. Our Super Cellular Network provides immediate access, in California and Nevada." "Superior Coverage[:] Our commitment to service brings you superior coverage throughout major cities in California and Nevada, and across the county, with new cities being added continually * * *. Only Cellular One offers you the Super Cellular Network – the most advanced network available. It offers exceptional dialing convenience, with direct-dial capabilities and instant activation. * * * When travelling within the network, you can place and receive calls instantly. Unlike other cellular systems, you do not have to press a series of numbers to activate and deactivate this service – it's automatic." "Cellular One, the nation's largest provider of cellular service, is first to bring you the Super Cellular Network. When you travel within the network, you can place and receive calls without waiting." "Through an agreement between Cellular One and LA Cellular [SanBusing], Ventura county residents enjoy a five-county local calling area that includes Ventura, Los Angeles, San Bernardino, Riverside and Orange Counties. We are continually adding new cell sites in order to increase coverage and enhance system quality for mobile and portable telephone use." "Cellular One is continually expanding its home system and bridging cellular networks to make communication throughout California and Nevada as simple as in your home area." McCaw's network "[a]llows callers to reach you outside your home area without using roamer access dialing procedures or pre-calling registration. They simply dial your local mobile phone number." McCaw's "Super Cellular Network includes these major cities[:] Redding, Marysville, Yuba City, Napa, Santa Rosa, Sacramento, Oakland, San Francisco, Stockton, San Jose, Modesto, Monterey, Fresno, Visalia, Bakersfield, Santa Barbara, Ventura, Palm Springs, Los Angeles, Reno, Las Vegas."

* Colorado: "[T]he Cellular One system provides coverage all along Colorado's Front Range."

* Minnesota: "In Minnesota, you can enjoy the clarity and reliability of Cellular One's coverage throughout the Minneapolis/St. Paul and Rochester areas. Coverage in St. Cloud is anticipated in third quarter 1990."

* Oklahoma: "Largest Cellular Carrier in the Nation * * * Larger Metro Coverage Area." "The Cellular One SuperSystem offers you the region's largest cellular telephone coverage. * * * With the Cellular One SuperSystem, you get the exclusive convenience and peace-of-mind of dealing with one company in Tulsa, Oklahoma City, Ft. Smith, and Fayetteville, because Cellular One is the one company operating cellular phone systems in all four cities."

* Kansas: "[L]argest coverage area in Wichita * * *. Only Cellular One lets you make and receive calls all the way from Cheney Reservoir to El Dorado Lake." "[C]ontinuous cellular coverage as you travel between Kansas City, Lawrence, Topeka and St. Joseph." "All calls you place to Kansas City, Lawrence, Topeka and St. Joseph are local calls without long distance charges." "Wichita Cellular One is part of McCaw Cellular Communications, Inc., the nation's largest cellular telephone company serving more cities coast-to-coast than any other company." "Quality Cellular One coverage completely blankets the Wichita area including ninth past El Dorado, east to Beaumont, south past Belle Plaine and west past Cheney Reservoir, to keep you talking in the cities you drive to – and work in – most often." "In 1991, we plan to increase our Kansas/Missouri coverage by 150%." This increase "[i]ncludes switch sharing agreements and Rural Service Areas." "As the Nation's Largest Cellular Communications Company, we offer: Service in more than 400 cities coast-to-coast. * * * Access to new cellular cities, throughout the U.S. and Canada, as soon as they become operational. NationLink service allowing callers to reach you automatically as you travel." "Calls to your local cellular phone automatically find you anywhere within the network."

* Utah: McCaw's Cellular One coverage area is "the largest of any service provider in Utah."

Sources: McCaw Sales Brochures & Coverage Maps for Florida; McCaw Sales Brochure & Coverage Map for Austin, TX; McCaw Sales Brochures & Coverage Maps for California; McCaw Sales Brochure & Coverage Map for Denver, CO; McCaw Sales Brochure & Coverage Map for Minneapolis, MN; McCaw Sales Brochures & Coverage Maps for Oklahoma; McCaw Sales Brochures & Coverage Maps for Kansas; McCaw Sales Brochure & Coverage Map for Salt Lake City, UT (coverage extends 125 miles east-west along I-80 and 140 miles north-south on I-15).

Technical Considerations

It is one thing to recognize what the customers want; it is another (and more difficult) thing to provide geographically unbounded service to meet consumer demand. Linking together mobile services into a seamless whole is difficult. Some approaches work better than others. Among suppliers of mobile services, competition is thus being shaped, in the first instance, by extremely complex technological choices.

Paging, for example, is technologically simple when only a single transmitter is used. It is not possible, however, to provide national (still less international) service with a single huge transmitter; broader geographic coverage therefore requires simultaneous broadcast from many transmitters, all closely synchronized to avoid confusion when a receiver is in range of two or more transmitters. Such coordination is currently achieved using "simulcast," with airwave control channels maintaining synchronization among multiple transmitters.[71] At one time, some providers (including MCI) apparently planned to use the landline long distance network to maintain this synchronization.[72] These plans failed because they embodied inferior technical choices. According to the marketing director of Cue, a major (and successful) provider of paging services, "satellite efficiency is key."[73]

Similar challenges, though notably more complex, arise in the provision of cellular telephone service.[74] Even "local" cellular service presents a giant challenge of coordination. The key innovation in cellular telephony was to replace the single high-power transceiver with many smaller ones operating at low power -- to replace, in effect, a single larger service area with many smaller ones.[75] This subdivision of operations

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[71] *New Spectrum May Help Wide Area Paging*, INDUSTRIAL COMMUNICATIONS, June 15, 1990, at 6.

[72] MCI, for example, expressed early interest in offering a nationwide paging system, which it apparently intended to link using its long distance telephone network. *FCC Approves National Paging, New Radio Services*, DAILY REPORT FOR EXECUTIVES, Apr. 7, 1988, at A-15.

[73] *FM Subcarriers Employed; Diversicom Introduces Nationwide Paging Using Satellite*, COMMUNICATIONS DAILY, Oct. 10, 1985, at 4.

[74] An in-depth discussion of the technical aspects of linking MTSOs using one or more independent interexchange carriers is beyond the scope of this report; a full discussion appears in affidavits and other papers already on file with the Department of Justice and the decree court. *See, e.g.*, Comments of the Bell Companies Regarding the Status of Equal Access Technology for Intersystem Handoff, United States v. Western Elec. Co., No. 82-0192 (DOJ Apr. 22, 1991); Memorandum of the Bell Companies in Response to MCI Communications Corporation's Letter Dated May 10, 1991 on the Feasibility of Incorporating Equal Access into the Intersystem Handoff Process, United States v. Western Elec. Co., No. 82-0192 (DOJ May 20, 1991); Motion of the Bell Companies for Partial Relief from Section II(D) Restrictions of the Decree, United States v. Western Elec. Co., No. 82-0192 (D.D.C. June 18, 1990).

[75] As described by the FCC in 1974, spectrum is "divided into discrete channels which are assigned in groups to small geographical cells covering a defined service area. The key to the cellular system's high capacity is its ability to shrink the size of those cells while holding the total amount of spectrum used by the

allows spectrum to be used very efficiently, and thus allows many more customers to be served.

The idea is simple but its implementation is not. When a call is directed to a mobile user, the telephone must be paged in every cell. And because cells are small, an on-going call must frequently be "handed off" as a user moves from one cell to the next. Paging, handoff, and related aspects of inter-cell coordination are handled by connecting all the cells (by wire or radio) to a sophisticated switch -- a mobile telephone switching office ("MTSO"). The MTSO also verifies credit and serves as the point of contact with the landline network. A MTSO is typically designed to serve some 50,000 to 100,000 subscribers. In this respect, it is thus comparable to the lowest tier (class 5) switch in the landline network.

But as in the landline network, networking cannot end with the first tier of switches. The FCC recognized the importance of higher level interconnection in its first main cellular order in 1981, and it has emphasized this objective ever since.[76] The consumer does not know or care about cells or switches; he merely wants to be able to make and receive calls, and to remain connected as long as the conversation requires. MTSOs must therefore be interconnected in much the same way as cells. The basic objectives are the same: to allow a cellular phone to initiate calls wherever it may be ("roaming"); to allow it to receive calls wherever it may be ("call delivery"); and to keep on-going calls connected when a phone moves across MTSO boundaries ("intersystem handoff"). Engineering these capabilities has been the paramount challenge faced by cellular providers in supplying the services that consumers demand.

Intersystem handoff presents the most immediate as well as the most difficult challenge. When a car driving down an expressway moves from one MTSO's territory to another's, the first switch will typically have only seconds or less to hand off control to the second; any greater delay will result in the call being dropped. Direct connections between MTSOs, with no other intervening switches, are fast enough. FIGURE 2.2(A). Indirect connections through the landline network often will not be. With current (in-band) signaling methods, each additional switch interposed between the two MTSO's will typically add a second or two of delay. FIGURE 2.2(B).

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system constant. What results is a multiple re-use of channels throughout a given geographical area * * * ." An Inquiry Relative to the Future Use of the Frequency Band 806-960 MHz, 46 F.C.C.2d 752, 753 (1974).

[76]The Commission declared in 1981 that in considering license applications it would emphasize an applicant's "ability to coordinate the use of channels with adjacent or nearby cellular systems." 86 F.C.C.2d at 503. Thereafter, the FCC repeatedly noted the importance of achieving nationwide compatibility in cellular services. To that end, it preempted state regulation of technical standards (*id.* at 504-505) and actively encouraged providers to develop and conform to technical compatibility standards. *See, e.g., Cellular System Mobile Station – Land Station Compatibility Specification*, OST Bulletin No. 53 (specifying frequency usage, power output, modulation characteristics, emission limitations, and signaling protocols), *cited in* Amendment of Parts 2 & 22 of the Commission's Rules to Permit Liberalization of Technology & Auxiliary Serv. Offerings in the Domestic Pub. Cellular Radio Telecommunications Serv., 3 FCC Rcd 7033, 7038 (Dec. 12, 1988).

Figure 2.2(a). Direct Connection of MTSOs.

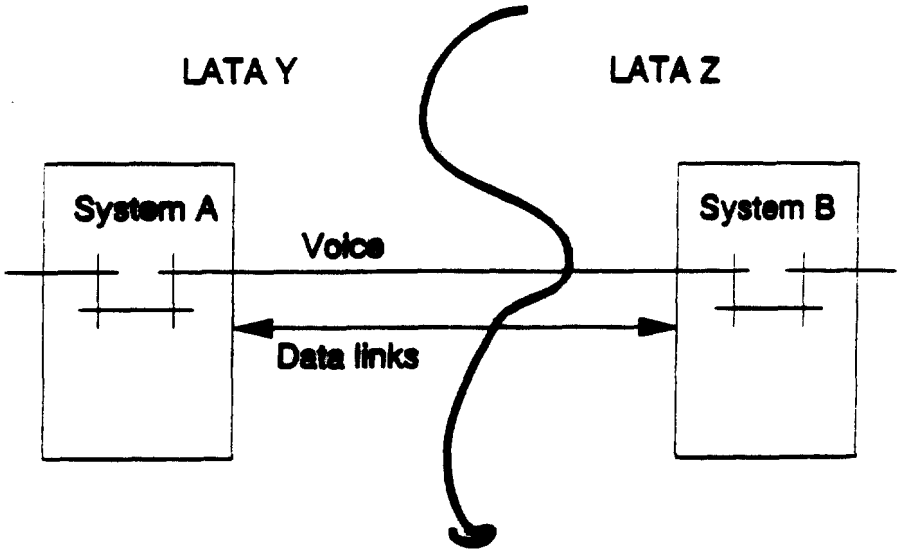
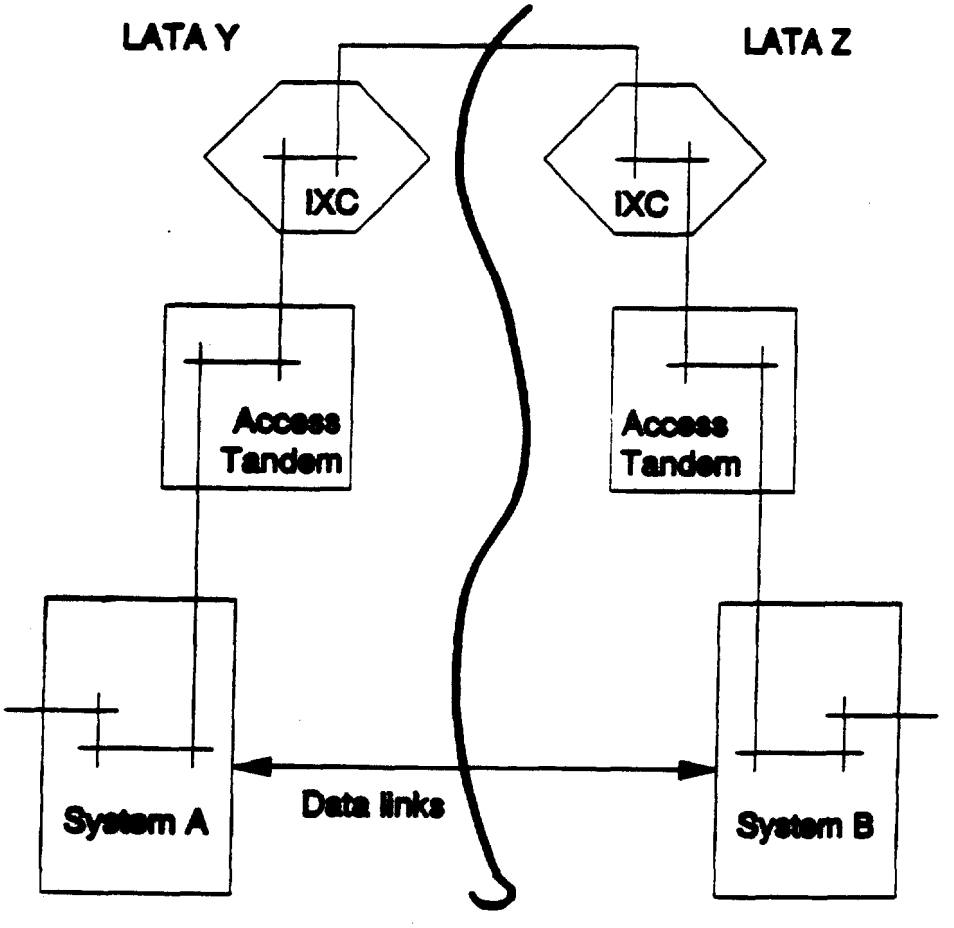


Figure 2.2(b). Indirect Connection of MTSOs.



It is easy to underestimate the complexity of the handoff process. Today, handoffs are initiated at the serving cell (when the strength of the signal drops below a predetermined threshold) and coordinated by gauging the strength of the signal from the phone to nearby cell sites: when one cell reports a stronger signal than the other, the call is handed off. The measured signal strength is often adjusted prior to the decision; this adjustment is controlled by the system's engineer. The strength of the signal can be affected by many factors, not just proximity. Even if the phone is not moving at all, several handoffs a minute may occur if it is about equidistant from two or more transceivers. When a phone is moving fast, especially along a seam between several cells, there may be rapid handoffs back and forth before a clear priority is established. Fast circuits can handle this relatively easily; slow ones cannot.

A final layer of complexity in intersystem coordination comes from the need for fair dealing with customers. What the customer initiates as a local call may become an intersystem call part way through; other than dropping the call, there is no way of notifying the customer of this change. Similarly, what starts as a "long distance" call can become a local one -- and then bounce back and forth between local and intersystem status any number of times as a car moves along a seam between two systems. The complexities are compounded when both the calling and called party are using mobile phones, perhaps even while both move across system boundaries.

The problems of intersystem coordination are thus highly complex, and no simple engineering arrangement resolves all of them perfectly. From a technical perspective, the most direct, reliable, and uncomplicated way of expanding coverage is to expand the number of cells served by a single MTSO, and if necessary to place some secondary slave switches under the control of an already established MTSO. Intersystem coordination inevitably becomes necessary at some point. The most essential single requirement here is wide flexibility to determine where systems are deployed or combined, how traffic is handed off, and how costs are passed on to customers.

Producer Perspectives

All major providers of mobile services have recognized that the geographic scope of their service must expand continuously to keep pace with consumer expectations. All producers with the freedom to do so have thus put in place business strategies that center on geographic clustering, consolidation, and intersystem coordination.

Paging Services. The dismantling of geographic boundaries in mobile services has proceeded most rapidly with paging services. These services were once strictly local. Today, they are becoming regional and national.[77]

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[77]According to Michael Vernetti, senior vice president of Telocator, a trade group for the mobile communications industry, "[r]egional coverage by paging companies has emerged as a strategy during the last few years." *Abrahms, Mid-Atlantic Paging Stretches Network From Virginia to Boston*, WASHINGTON BUS. J., Sept. 17, 1990, § 1, at 23. An Arthur D. Little analyst estimates that in 1990 there were roughly 400,000 users of intercity services, which include both national and regional subscribers; use of these services was

The geographic expansion of the paging market has occurred on two separate tracks. As early as 1985, paging companies were beginning to develop regional services by interconnecting them and coordinating their operations. Providers developed scanning pagers that could monitor many frequencies, and thus pick up messages broadcast by any affiliated local FM radio station.[78] Even as these regional services were being developed, the FCC assigned new spectrum for national services operating on a single frequency.[79] The first such service (Skypager) came into operation in March 1987[80] and usage of the service has grown rapidly since.[81]

Paging companies have quickly recognized the importance of forming alliances to expand the geographic scope of their coverage.[82] In early 1985, for example, Cue signed an agreement with CBS-owned and operated FM radio stations to transmit its paging signals.[83] As of early 1990, Cue had 228 affiliations with FM broadcasters; it was then sold to Seltech (a joint venture of twenty-three Canadian broadcasters), which already had 200 similar affiliations.[84] Telefind's interconnected paging network was affiliated with over 146 MSAs in the United States and had "arrangements for affiliation in Canada, Mexico, Puerto Rico, Argentina, Chile, The United Kingdom, Hong Kong, Japan,

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growing faster than any other sector of the market. Titch, *Nationwide Paging Companies Undaunted by Metrocast Folding*, TELEPHONY, July 16, 1990, at 8.

[78]Daniel, *Nationwide Paging Service Makes Debut Here*. S. FLA. BUS. J., Feb. 24, 1986, at 1.

[79]Amendment of Parts 2 & 22 of the Commission's Rules to Allocate Spectrum in the 928-941 MHz Band & to Establish Other Rules, Policies & Procedures for One-Way Paging Stations in the Domestic Pub. Land Mobile Radio Serv., 69 F.C.C.2d 1337, 1347 (1982); Amendment of Parts 2 & 22 of the Commission's Rules to Allocate Spectrum in the 928-941 MHz Band & to Establish Other Rules, Policies & Procedures for One-Way Paging Stations in the Domestic Pub. Land Mobile Radio Serv., 93 F.C.C.2d 908, 913-914 (1983).

[80]ROBINSON-HUMPHREY CO., MOBILE TELECOMMUNICATIONS TECHNOLOGIES CO. – COMPANY REPORT (July 30, 1990).

[81]*See MTEL Units In Service Exceed 125,000 at Year End, 78 Percent Increase Over 1989 Level*, PR NEWSWIRE, Jan. 16, 1991; Abrahms, *Mid-Atlantic Paging Stretches Network From Virginia to Boston* WASHINGTON BUS. J., Sept. 17, 1990, § 1, at 23.

[82]"The drive to interlink carriers' coverage to wide metropolitan and multicity areas has * * * resulted in the creation of many joint ventures among RCCs," notes an analyst at Arthur D. Little. "Through intercarrier exchange agreements, these operations can now offer multicity roaming service to their paging subscribers, enhancing the marketability of their services to potential subscribers who frequently travel between cities." Bean, *Paging Outlook 1990*, TELOCATOR, Jan. 1990, at 28.

[83]Daniel, *Nationwide Paging Service Makes Debut Here*, S. FLA. BUS. J., Feb. 24, 1986, at 1.

[84]*Noble Group Earnings Increase 40 Percent*, PR NEWSWIRE, June 21, 1990; *Cue Paging Goes International with Purchase by Seltech*, INDUSTRIAL COMMUNICATIONS, Apr. 6, 1990, at 3.

The Philippines and Australia."[85] Mid-Atlantic Paging of Alexandria recently completed a network that extends from Virginia Beach to Boston.[86] Numerous other firms have developed regional or wide-area services through similar joint ventures or partnerships.[87]

Meanwhile, the FCC in 1982 allocated three frequencies specifically designated for regional or nationwide paging services.[88] In 1983, the FCC decided that all three frequencies should be dedicated specifically to nationwide networks.[89] Concerned, however, that these few, select national licensees would be able to leverage their national license to obtain advantage in local markets, the FCC decided to require each licensee to be "in operation" on a nationwide basis before incidental local service could be offered.[90] MTEL's Skypager began offering a nationwide service on one of these frequencies in 1987.[91] Its system now encompasses 185 MSAs covering over 90% of the total U.S. MSA population;[92] subscribership rose rapidly, from 18,600 in 1988[93] to 84,300 in 1990.[94]

By 1989, just five years after it had begun the process of licensing national paging services, the FCC recognized that its orderly plans had been overtaken by technology

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[85] *Telefind Corp. Forms Joint Venture to Bring International Messaging/Paging Capabilities to Japanese*, PR NEWSWIRE, Mar. 17, 1989.

[86] Abrahms, *Mid-Atlantic Paging Stretches Network From Virginia to Boston*, WASHINGTON BUS. J., Sept. 17, 1990, § 1, at 23. Mid-Atlantic operates as the managing general partner of six limited partnerships that independently cover different areas in the Northeast. The company switched on its system in March 1989 and by September 1990 reportedly had more than 40,000 subscribers. *Ibid.*

[87] MobileComm, a BellSouth subsidiary based in Jackson, Mississippi, began marketing its new Northeast Corridor Regional Paging in the spring of 1990. Other firms that have entered the regional paging market include Southern New England Telephone; Radiofone, a New Orleans company that operates the Cajun Connection on the Gulf Coast; and US West, which recently purchased Answer Iowa. Richards, *Pager Companies Count on Masses to Answer Call of Cheaper Fees*, USA TODAY, Sept. 5, 1990, at 6B.

[88] 89 F.C.C.2d at 1347.

[89] 93 F.C.C.2d at 913-914.

[90] *Id.* at 913 n.8.

[91] ROBINSON-HUMPHREY CO., MOBILE TELECOMMUNICATIONS TECHNOLOGIES CO. – COMPANY REPORT (July 30, 1990).

[92] J.C. BRADFORD & CO., MOBILE TELECOMMUNICATIONS TECHNOLOGIES CORP. – COMPANY REPORT (Dec. 7, 1990).

[93] ROBINSON-HUMPHREY CO., MOBILE TELECOMMUNICATIONS TECHNOLOGIES CO. – COMPANY REPORT (July 30, 1990).

[94] *MTEL Units in Service Exceed 125,000 At Year End; 78 Percent Increase Over 1989 Level*, PR NEWSWIRE, Jan. 10, 1991.

and market developments. "In the years since we determined that allocation of three nationwide paging channels were required," the Commission acknowledged, "some new technologies and new uses for existing technologies have created *de facto* nationwide paging systems from individual stations (generally by connecting them to satellite relays)."[95] The FCC went on to note that "expanded paging systems cover large regions, giving many subscribers inter-city paging as well as local paging in their regions."[96] The FCC accordingly rescinded the restriction it had imposed on national licensees. Henceforth, paging companies were free to expand either from local to national or national to local as market forces required.[97] In short, the geographic scope of paging services has expanded rapidly, overtaking even the FCC's licensing time-table.[98]

There is clearly still some geographic segmentation of the market; nationwide paging companies, for example, aim particularly at middle and upper level managers.[99] It is equally clear, however, that services of different geographic scope merge into each other. From the consumer's perspective, a larger geographic range is always preferable. And for providers, broader coverage is simply a matter of coordinating broadcasts by multiple local transmitters.

Cellular Services. Providers of cellular services have responded in similar ways to the fall of regulatory boundaries and the rise of consumer demand for ever broader service coverage. They have either expanded geographically or developed strategic alliances -- or they have sold out of the business. *See, e.g.*, TABLE 2.3.[100] No major

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[95]Flexible Allocation of Frequencies in the Domestic Pub. Land Mobile Serv. for Paging & Other Servs 4 FCC Rcd 1578, 1581 (Feb. 15, 1989).

[96]*Ibid.*

[97]*Id.* at 1581-1582.

[98]In February 1988, the decree court recognized that the paging industry had evolved quite independently of LATA boundaries, and that in order to compete effectively in the paging market, providers must offer paging services on an area-wide basis. Accordingly, the court eliminated the decree's geographic restrictions on the RHCs' provision of one-way paging. Memorandum and Order, United States v. Western Elec. Co., No. 82-0192 (D.D.C. Feb. 16, 1988).

[99]Bowen, *Opportunity Beeps for Telco Paging*, TELEPHONY, May 30, 1988, at 31.

[100]Ownership information for MSA and RSA licenses was taken primarily from FCC listings, current as of May 13, 1991. This information was supplemented by various sources, including CTIA publications, other industry trade publications, and company annual reports.

RSAs licenses, in particular, are frequently held by limited partnerships. Limited partnerships have anywhere from two to well over ten members. Often there is both a general and a managing general partner, and those members do not necessarily have a majority, or even the largest, share of the license. The composition of partnerships varies. Some are composed of several individuals with few or no ties to larger cellular companies; others are made up of one or two large, well-known cellular players plus

player believes that it can long continue to operate mobile services island by island; all are aiming to build up seamless, nationwide service by direct acquisition, by reselling other companies' services,[101] or by developing technology that will make corporate (and therefore geographic) lines essentially invisible to the consumer.

Table 2.3. Growth of Non-RHC Cellular Companies by CGSA License (Number of Licenses).

	1984	1985	1986	1987	1988	1989	1990	1991
McCaw	3	9	21	37	80	94	108	NA
GTE	8	13	14	33	38	42	79	189
Contel	3	14	18	29	43	57	112	0
Centel	0	6	7	15	46	51	77	79

Sources: Company annual reports; CTIA, STATE OF THE CELLULAR INDUSTRY (Spring 1990); FCC, STATUS OF MSA CELLULAR MARKETS (May 13, 1991); FCC, STATUS OF RSA CELLULAR MARKETS (May 13, 1991); PAUL KAGAN ASSOCS., 1991 CELLULAR TELEPHONE ATLAS (Feb. 1991); PHILLIPS PUBLISHING, INC., 1991 MOBILE COMMUNICATIONS DIRECTORY (1991). Figures include both MSAs and RSAs in which the company is known to have a minority interest. Because of the GTE/Contel merger, Contel's properties have been added to GTE's in the 1991 figures, except that areas in which Contel and GTE both owned interests prior to the merger are only counted once. Table includes data through May 1991.

All major providers of cellular service have recognized that the filling out of the licensing map (see MAP 2.1(C), *supra*) has created critical new market opportunities. The allocation of rural licenses makes possible, for the first time, service within a steadily expanding geographic market. When only MSAs had been licensed, service areas were isolated islands. Clustering strategies were infeasible. Today, "supersystems" are possible, and they are being assembled very aggressively. Such systems give subscribers service of broader coverage, more like the geographically unbounded service that consumers rank very high in selecting service. New subscribers can be served on existing switches. And important economies can be realized as marginal consumers in outlying areas are served with these switches.

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numerous smaller entities; still others may include solely well-established cellular companies. Limited interests are often negligible – a one percent or smaller interest is not uncommon. Obviously, the practical input such a limited partner would have in the operation of the license and the service provided would be correspondingly negligible. As a result, in our maps, tables, and charts, unless otherwise noted, only the interests of the general or managing partner are included.

In several cases, it is not clear from FCC data or other sources who controls a partnership (and the identity of the limited partners is even less clear). If we were unable to determine with reasonable certainty the ownership of a particular license, we did not tabulate or map that license. As a result, the cellular holdings of the companies may be slightly understated.

[101]According to CTIA's estimates, the number of resellers in the U.S. has grown from 107 in early 1985 to 363 by the end of 1990. CTIA, DATA SURVEY THROUGH DECEMBER 1990, at 1 (1991).

Clustering. Just a few years behind the paging companies, cellular companies are now rapidly assembling the components needed to provide regional services. The first and most direct strategy is direct consolidation of contiguous service areas. "The trend in cellular is to cluster," a trade journal noted in September 1990.[102]

"Clustering" has indeed become the key to competitive advantage in the cellular industry. McCaw's 1987 annual report identified "[t]he development of regional clusters" as a crucial element of its operating strategy.[103] Two years later the company reported: "Within its clusters, McCaw Cellular has pursued an aggressive acquisition strategy designed to * * * continuously enlarge the service area provided by obtaining majority or controlling interests in successively adjacent markets * * *."[104] Craig McCaw elaborated on this in a 1989 speech. He identified "[t]he regionalization of the industry" as a dominant trend in the cellular market.

> I am using regionalization to describe groupings of cellular systems based on geography, population, and trading patterns. The term comprises three activities:
>
> First, consolidation of our fragmented industry through mergers, acquisitions and other combinations -- something we've been active in.
>
> Second, asset trades to create geographical concentrations of systems.
>
> And finally, coalitions between nearby systems to develop seamless regional services, which are already beginning to happen.
>
> These regional consolidations and coalitions are what create the most desirable service for customers.[105]

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[102] *Central Focuses on Southwest and Mexico*, MOBILE PHONE NEWS, Sept. 13, 1990, at 1.

[103] MCCAW CELLULAR COMMUNICATIONS, INC., 1987 ANNUAL REPORT 3 (1988).

[104] MCCAW CELLULAR COMMUNICATIONS, INC., 1989 ANNUAL REPORT 4 (1990).

[105] MCCAW CELLULAR COMMUNICATIONS, INC., CELLULAR COMMUNICATIONS: A VISION OF THE FUTURE 6 (Oct 20, 1989).

McCaw pointed out that the United States "is the only country in the world that does not have a national cellular license on either the wireline or the non-wireline side of the spectrum."[106] He went on to describe how market forces were in the process of creating the broader geographic integration that regulators had declined to impose. McCaw of course promised that his company would be a leader in pursuing integration of this kind. In April 1991, McCaw declared:

> Within the next 90 days, we will begin to link major markets on the Atlantic and Pacific coasts, transforming cellular from primarily city-by-city technology into a North American network in which cellular telephones will work in a consistent way across the United States, Canada and Mexico. Within this network, callers will be able to reach cellular customers without having to know their locations simply by dialing the customer's cellular telephone number.[107]

For several years, McCaw has indeed coordinated its acquisitions and sales in just that way, to build contiguous service clusters and to dispose of isolated licenses.[108] One of the company's declared competitive objectives is to "[d]evelop coverage advantages [versus the] competition, including accessing the RSAs."[109] The company has accordingly standardized its switching equipment to allow seamless integration of service. And it has then integrated its service. By 1990, McCaw's eight major clusters encompassed majority or minority interests in 100 MSAs (and 8 RSAs) -- an average of 12 MSAs per cluster. TABLE 2.4. In 1990 alone, McCaw added 2 MSA or RSA service areas each to its Northeast, California, Upper Midwest, and Texas clusters; 1 service area to its Rocky Mountain cluster; and 5 service areas to its flagship Pacific Northwest cluster.[110] During this same period, McCaw systematically divested its more dispersed proper-

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[106] *Id.* at 6.

[107] MCCAW CELLULAR COMMUNICATIONS, INC., 1990 ANNUAL REPORT 1 (1991).

[108] As Craig McCaw recently explained, "[w]ith the closings of the Contel and LIN transactions, more than 65 percent of McCaw's and LIN's POPs will be concentrated in California, Texas, Florida, New York and Pennsylvania. Approximately 80 percent will be in the nation's 30 most populous markets and in contiguous service areas." *McCaw Cellular Earns*, PR NEWSWIRE, May 10, 1990; *see also* MCCAW CELLULAR COMMUNICATIONS, INC., 1989 ANNUAL REPORT 3 (1991) ("[a]pproximately 80% of [McCaw's] cellular interests are in regional clusters that include large metropolitan areas").

[109] MCCAW CELLULAR COMMUNICATIONS, INC., MCCAW'S GOALS AND VALUES 9 (current as of Jan. 1991).

[110] MCCAW CELLULAR COMMUNICATIONS, INC., 1988 ANNUAL REPORT 8-11 (1988); MCCAW CELLULAR COMMUNICATIONS, INC., 1989 ANNUAL REPORT 5-7 (1990).

ties.[111] McCaw then used the proceeds from a major sale to finance its acquisition of LIN, which offered an excellent geographic fit.[112] *See* MAP 1.1, *supra*.

Table 2.4. McCaw's Clusters (Number of MSAs and RSAs).

Geographic Area	1984	1985	1986	1987	1988	1989	1990
Florida			1	5	11	12	12
California/Nevada			2	8	12	17	19
Pacific Northwest (WA, OR, ID, AK, HI)		3	3	4	11	13	18
Northeast (NY, MA, PA, WV)	1	2	5	5	9	9	11
Rocky Mountains (UT, CO)			2	2	6	7	8
Midwest (KS, OK, MO, AR)	1	2	5	6	10	12	12
Upper Midwest (MN, WI, IL, IN)	1	1	1	3	11	13	15
Texas (TX, LA, MS)		1	2	4	10	11	13
Total	3	9	21	37	80	94	108

Sources: McCaw Cellular Communications, Inc., 1990 Annual Report 7-9 (1991); McCaw Cellular Communications, Inc., 1989 Annual Report 5-7 (1990); FCC, Status of MSA Cellular Markets (May 13, 1991); Paul Kagan Assocs., 1991 Cellular Telephone Atlas (Feb. 1991); Phillips Publishing, Inc., 1991 Mobile Communications Directory (1991).

Notes: Licensing dates as reported by the FCC are used unless McCaw's annual reports expressly provide a different date of acquisition of an already operating system. Figures include service areas in which McCaw has a limited interest and do not reflect the 13 properties sold to Contel or the sale of 17 properties to BellSouth.

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[111] For example, McCaw sold 13 cellular franchises it operated in Kentucky, Tennessee, and Alabama, to Contel. Travis, *Contel Moves Up Cellular Ladder With Acquisition of McCaw Units*, Telephony, Mar. 5, 1990, at 10. Recently, McCaw and BellSouth finalized the sale of McCaw's interests in 17 cellular properties in Indiana, Wisconsin, and Illinois. *BellSouth, McCaw Complete Cellular Transaction*, PR Newswire, Sept. 23, 1991.

[112] *When the Smoke Clears, McCaw Stock will Pay Off, Says Firm*, Industrial Communications, Aug. 3, 1990, at 4. As Craig McCaw stated: "The need for rationalization and consolidation into logical regional groupings is what underlies our offer for LIN and our agreement to buy Metromedia's New York interests. Combined with our corporate properties, they create the potential for state-of-the-art, integrated systems in the Northeast, Texas and California." McCaw Cellular Communications, Inc., Cellular Communications: A Vision of the Future 7 (Oct. 20, 1989).

Other cellular providers have been pursuing identical strategies. Until its merger with GTE, Contel was systematically seeking geographic consolidation. **MAP 2.2(B)**. Contel's 1988 annual report declared: "Contel Cellular's strategy for growth is to build or acquire systems in geographic 'clusters' * * *. The company also seeks to merge contiguous systems, through advanced microwave technology, into supersystems where feasible."[113] The following year, Contel identified the broader coverage areas made possible by the integration of adjacent service markets as a key source of its "competitive advantage."[114] In October 1989, Contel purchased McCaw's interests in thirteen south-east properties, most of which were contiguous with existing Contel systems. "These target markets have established systems in service, using technology compatible with our own, which will result in strategic integration with our existing markets," the company's president declared.[115] At one point, Contel even sought trademark protection for the term "super-system."[116]

As early as 1986, GTE's vice president of marketing and business planning stated: "GTE Mobilnet is * * * focusing on those small cities which are adjacent to their main areas of [cellular] service, allowing them to expand service in a particular part of the country. The aim is to fill in the gaps between prime cities so as to provide service in contiguous areas throughout a particular region * * *. The name of the game in cellular

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[113]CONTEL, 1988 ANNUAL REPORT 14 (1989). Contel's acquisition of Southland Mobilcom's interests in several areas furthered this strategy, allowing Contel to "assemble[] the elements for an Alabama-Florida supersystem, similar to existing systems in California and Virginia." *Ibid.* Contel also sought "strategically located * * * rural service areas" to enhance its regional development. In particular, Contel's "participation in California RSAs will bolster [its] existing supersystem in the San Joaquin Valley." *Ibid.*

[114]CONTEL, 1989 ANNUAL REPORT 6 (1990) ("[t]hrough their integration with our existing metropolitan markets, RSAs will allow for broader calling areas, thereby providing a competitive advantage"); *see also id.* at 13 ("[t]hese RSAs will play an integral role in expanding calling coverage and will provide Contel with a distinct advantage over its competitors in each market"). In 1989, the FCC did indeed award the company 42 RSA licenses and approved its role as a non-operating partner in 15 other RSAs. The awarded properties "are adjacent to Contel Cellular's existing metropolitan markets, which will allow for extended geographic calling coverage." *Id.* at 1. Contel has frequently sought to acquire key RSAs that it could not win directly from the FCC. In early 1991, for example, Contel announced plans to acquire Kentucky #7 in order to "form a strategic link between its [MSA] systems." *Contel Cellular Purchases Kentucky RSA*, MOBILE PHONE NEWS, Mar. 14, 1991, at 7.

[115]*Contel to Acquire Southeastern Properties of McCaw Cellular Communications for $1.3 Billion*, NEWSWIRE, Oct. 3, 1989; *see also* Travis, *Contel Moves Up Cellular Ladder With Acquisition of McCaw*, TELEPHONY, Mar. 5, 1990, at 10.

[116]*See* Application for Service Mark Registration, Serial No. 73/782186 (filed with U.S. Dep't of Commerce, Patent & Trademark Office, Feb. 21, 1989). In advertising that the company attached to its trademark application, Contel described a super-system as one "contain[ing] large areas for extended coverage * * *." The application was denied. *See* Office Action Letter from Edward Nelson, Trademark Attorney, Patent & Trademark Office, to Jerry W. Mills, Baker, Mills & Glast (May 23, 1989).

today is contiguous coverage."[117] GTE's vice president of marketing and business planning cites GTE's systems in California, Texas, and Ohio as examples of its clustering strategy.[118] By 1986, GTE operated systems in San Francisco and San Jose and was in the process of expanding coverage into Santa Rosa and Santa Barbara. In Texas, GTE operated systems in Houston and Austin and had targeted the nearby areas of Beaumont and Galveston for further expansion. GTE also planned to add Canton to its Cleveland and Akron, Ohio system.[119] GTE added 18 MSAs to its system in 1987, most of them contiguous with existing properties.[120] In 1988, GTE further expanded its cellular holdings to 34 MSAs in a continuing effort to "expand its areas of coverage."[121] When it purchased the cellular properties of the Providence Journal in 1990, the acquisition created new contiguities around Raleigh and Durham, North Carolina; Augusta, Georgia; and Roanoke, Virginia.[122] Other similar consolidations have been made possible by GTE's very active pursuit of rural licenses.[123] MAP 2.2(A).

The GTE/Contel merger, completed on March 13, 1991, created a significant number of new contiguities. MAP 2.2(C). The merger buttressed GTE's geographic position in its existing West Coast, Midwest, and Southwest clusters, and solidified its Southeast cluster; it also established a new cluster in the Northeast. As one report on the merger noted, the combined networks, "like those of McCaw, are concentrated in one area, which is essential if a seamless network is to be created. Unless the operator has shares in networks in adjoining operating regions, roaming agreements must be

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[117]Vinton, Antelman & Portanlero, *Cellular Telephone; Branching Out of the Metropolis*, ELECTRONIC NEWS, Dec. 15, 1986, at 22.

[118]*Ibid.*

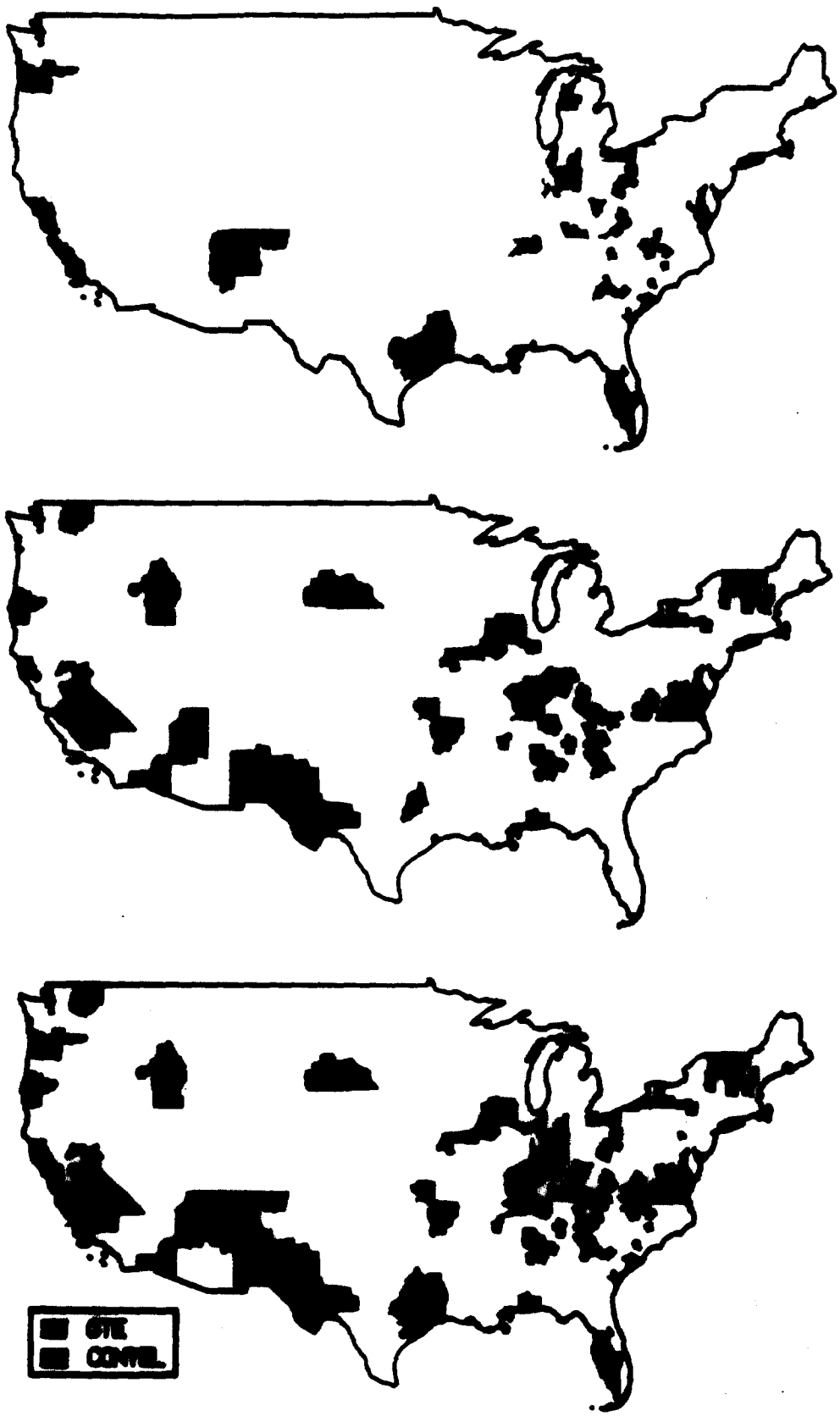
[119]*Ibid.*

[120]With the large addition, GTE became the fourth largest cellular carrier in the U.S. in terms of potential subscribers in areas served. GTE, 1987 ANNUAL REPORT 13 (1988).

[121]GTE, 1988 ANNUAL REPORT 21 (1989).

[122]*GTE Mobile Communications Completes Acquisition of Providence Journal Cellular Properties*, PR NEWSWIRE, Oct. 4, 1990. "Since many of the Providence Journal properties are contiguous to either GTE or Contel operations, this acquisition allows us to derive synergies and expand marketing opportunities," declared GTE's chairman and chief executive officer. *Ibid.* The president of GTE's Mobile Communications Group likewise noted that the purchase was of "contiguous markets in this sun-belt cluster of cities * * *." *GTE Mobile Communications Group to Acquire Providence Journal's Cellular Properties*, PR NEWSWIRE, Apr. 20, 1990.

[123]In August 1989, GTE was the first company to offer cellular service in an RSA. GTE, 1989 ANNUAL REPORT 20 (1990). By 1991, allowing for the Contel merger, GTE was operating as a general or limited partner in at least 90 RSAs. *See, e.g.*, FCC, STATUS OF RSA CELLULAR MARKETS (May 13, 1991); PAUL KAGAN ASSOCS., 1991 CELLULAR TELEPHONE ATLAS, (Feb. 1991). Because many licenses are held by limited partnerships and listings of partnership members are often not readily available, GTE may control or manage RSAs that are not included in these figures.



Map 2.2(a). Pre-Merger GTE Cellular Coverage.
Map 2.2(b). Pre-Merger Contel Cellular Coverage.
Map 2.2(c). Post-Merger GTE/Contel Cellular Coverage.

negotiated with other operators, which can be both costly and technically difficult."[124] The merger thus "provided the opportunity to create a second seamless cellular network."[125] According to one report, "GTE's moves to metamorphosize itself into a ubiquitous cellular player have been spectacular."[126]

The activities of McCaw and GTE richly illustrate the regionalization of competition. McCaw has built up its operations in Florida, for example, with acquisitions in 1986,[127] 1987,[128] and 1988.[129] MAP 2.3(8). Craig McCaw proudly notes that his company has "built a collection of incompatible systems into a superb integrated 'A' Block system statewide."[130] "[S]ince the telephone company is not a common partner in the compet-

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[124]*GTE-Contel Merger Creates USA's Second-largest Cellular Operator*, FINTECH MOBILE COMMUNICATIONS, July 19, 1990.

[125]*Ibid.; see also The New GTE: Country's Second National Cellular Network*, CELLULAR INVESTOR, Mar. 25, 1991, at 4 (describing GTE as the only cellular operator besides McCaw "with the look of a national network").

[126]*The New GTE: Country's Second National Cellular Network*, CELLULAR INVESTOR, Mar. 25, 1991, at 4.

[127]That year McCaw acquired the majority interests of cellular holdings in four Florida MSAs. Bulkely, *Cellular Phones: The New 'Must' Business Tools*, DENVER BUS. J., Nov. 3, 1986, § 1, at 19. McCaw closed the deal on the Orlando system (66% interest) in 1986, and on the other three (West Palm Beach, Jacksonville, and Tampa) in 1987. MCCAW CELLULAR COMMUNICATIONS, INC., 1987 ANNUAL REPORT 33 (1988).

[128]In 1987, McCaw agreed to acquire a major license in Miami, as well as an outstanding minority interest in the West Palm Beach system from the Washington Post Company. Westlund, *Cellular One Gearing Up with McCaw at its Side*, S. FLA. BUS. J., Oct. 12, 1987, § 1, at 17. This sale was completed on January 4, 1988. *Washington Post Reports Higher First-Quarter Profits*, REUTER BUS. REPORT, Apr. 26, 1988. Also in 1987, McCaw brought on line the Lakeland MSA. CTIA, STATE OF THE CELLULAR INDUSTRY 38 (Spring 1990).

[129]In 1988, McCaw began service in an additional five MSAs and finalized its purchase of the Miami system. MCCAW CELLULAR COMMUNICATIONS, INC., 1988 ANNUAL REPORT 8 (1989); CTIA, STATE OF THE CELLULAR INDUSTRY 38-39 (Spring 1990). McCaw's final Florida property, Ocala, began operation in 1989. CTIA, STATE OF THE CELLULAR INDUSTRY 39 (Spring 1990); MCCAW CELLULAR COMMUNICATIONS, INC., 1989 ANNUAL REPORT 5 (1990).

[130]MCCAW CELLULAR COMMUNICATIONS, INC., CELLULAR COMMUNICATIONS: A VISION OF THE FUTURE 5 (Oct. 20, 1989). McCaw goes on to state:

> The clarity and reliability of the system are top-flight by today's standards.
>
> Take a drive from Miami to Tampa to Orlando to Daytona Beach. Your calls are handed off seamlessly from one cell to the next. Your phone rings, even if the caller catches you passing through Hypolux or Pok City. When you answer, the quality of the service is outstanding.
>
> We call this service the "City of Florida," integrating a very long state. We are not the only ones with supersystems of this kind; but in Florida, we think we have the leading example in the nation.

Ibid.

ing firms throughout the state," declared one of McCaw's general managers in Florida, "they can't bring continuity to Florida on the wireline side of the marketplace."[131]

Meanwhile, GTE has developed its Florida service along identical lines on the opposite coast of the state. MAP 2.3(A). In November 1984, GTE provided Florida's first cellular service, in Tampa.[132] GTE has added both metropolitan and rural properties steadily ever since.[133] By 1990, GTE could boast of a network that provided coverage to nearly 8,500 square miles of contiguous coverage in a ten-county area.[134] Construction of cellular systems in other Florida RSAs is expected to continue over the next five years.[135]

The regionalization of service by GTE and McCaw has been more evident still on the West Coast. MAP 2.4(A)-(B). Both companies have pursued similar clustering strategies elsewhere. MAPS 2.5(A)-(B), 2.6(A)-(B). After McCaw purchased LIN, for example, it moved promptly to integrate McCaw's Texas/Louisiana cellular properties with LIN's system in Dallas-Fort Worth, Texas.[136] The regional network provides "automatic, effortless call delivery"[137] between various southwestern service areas.[138]

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[131] Johnson, *1987 Ushered in New Cellular Owner*, JACKSONVILLE BUS. J., Dec. 21, 1987, § 1, at 20.

[132] *New Cellular Racing Helmet to be Used at the GTE St. Petersburg Grand Prix*, PR NEWSWIRE, Oct. 23 1989.

[133] By 1987, GTE had added 4 MSAs along Florida's west coast, based around its initial Tampa system. More recently, GTE has received licenses in several Florida RSAs, through FCC lotteries and the acquisition of properties from United Telephone. *See* CTIA, STATE OF THE CELLULAR INDUSTRY (Spring 1990); MOBILE PHONE NEWS, Feb. 14, 1991, at 9.

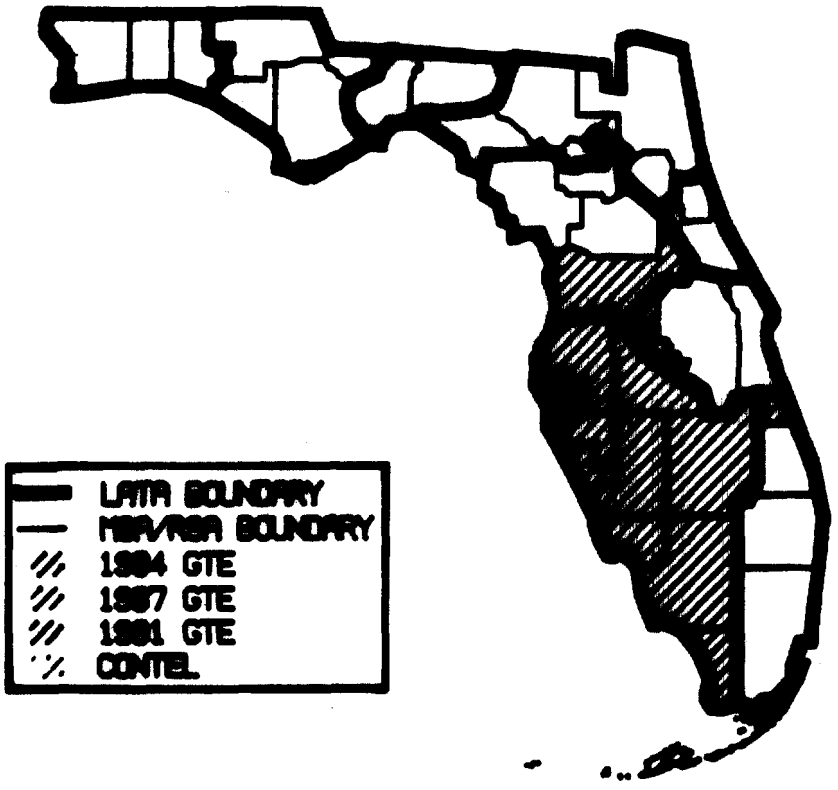
[134] The ten counties are Hillsborough, Pinellas, Pasco, Polk, Sarasota, Manatee, Lee, DeSoto, Hardee and Charlotte. *GTE Mobilnet Introduces Cellular Service to Florida's First Rural Service Area with Activation of Hardee RSA*, PR NEWSWIRE, July 24, 1990. With this activation, GTE declares that its customers "will now be able to travel important roads through these areas, such as I75, Highway 17 and State Roads 64 and 70 with uninterrupted service." *Ibid.*

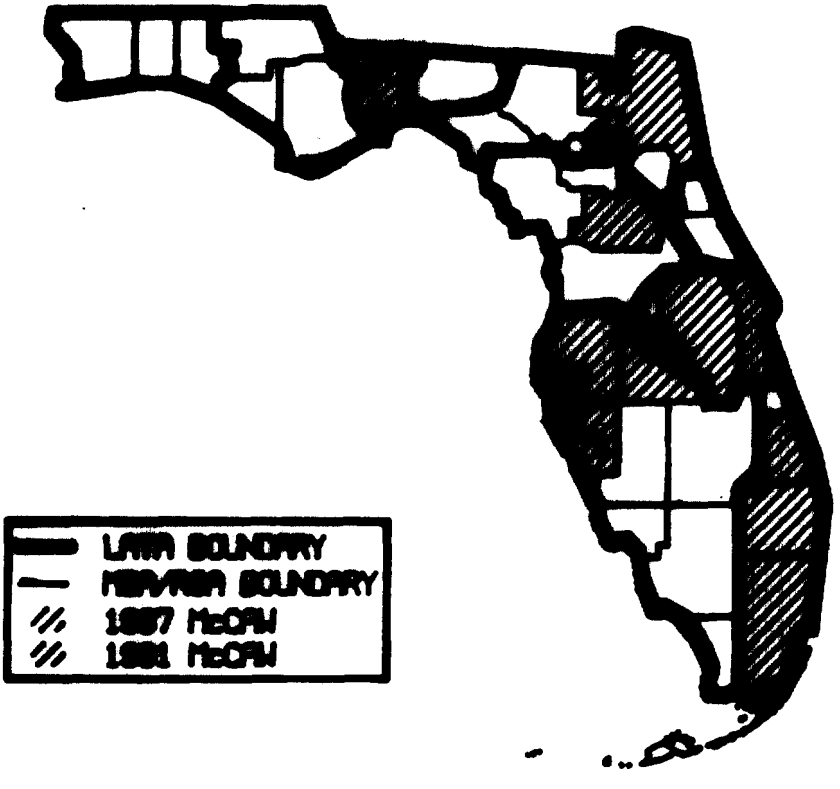
[135] *Ibid.*

[136] *McCaw Cellular and LIN Broadcasting to Form Seamless Southwest Region for Cellular Telephone Systems in Texas and Louisiana*, BUSINESS WIRE, Jan. 7, 1991.

[137] *Ibid.*

[138] The areas involved in the network include Dallas-Fort Worth and Sherman-Denison; San Antonio, Austin, and Temple-Killeen; and Longview, Texarkana, and Shreveport. *Ibid.*





Map 2.3(a)-(b). Florida Cellular Coverage of (a) GTE; (b) McCaw.